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Lajuana S. Wilcher  
Secretary

September 29, 2006

Dear Dr. Ormsbee,

We are pleased to present to you a report from the Mercury Task Force, an internal working group of staff members from our respective cabinets who have worked together to review and respond to the Environmental Quality Commission's recommendation regarding mercury contamination.

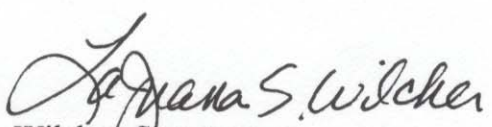
The members have identified our agencies' current public education and outreach efforts on mercury contamination and explored options to expand these activities and leverage state resources. The task force has also developed its own recommendations on how to enhance existing programs through additional collaboration and partnership efforts with other agencies, including EQC, universities, and local groups.


As an example of this type of collaboration, during April 2005, the Departments of Public Health, Education and Environmental Protection delivered a guidance letter to all Kentucky schools on how to prevent the spread of contamination in the event of a mercury release. The agencies initiated this outreach because of the alarming number of mercury releases that were occurring in our schools.

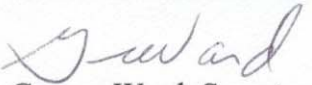
Mercury contamination is a serious issue not only in the Commonwealth, but across the nation. As you are aware, the federal EPA released the first-ever rule to reduce mercury emissions from power plants in March 2005. The rule will require new coal-fired plants to meet stringent mercury standards; however, the benefits from this rule will not be realized overnight. Therefore, in the meantime, it is crucial for states to continue education and outreach efforts to reduce citizens' exposure to mercury.

We look forward to an expanded partnership with the Environmental Quality Commission to begin implementation of the findings contained within this report.

Sincerely,

  
Lajuana S. Wilcher, Secretary  
Environmental and Public Protection Cabinet

  
Mark Birdwhistell, Secretary  
Cabinet for Health and Family Services

  
George Ward, Secretary  
Commerce Cabinet

# Mercury Task Force Report To the Environmental Quality Commission

Prepared by:  
Environmental and Public Protection Cabinet  
Cabinet for Health and Family Services  
Commerce Cabinet

September 2006



## **Mercury Task Force Report Executive Summary**

On January 22, 2004, the Kentucky Environmental Quality Commission (EQC) made five recommendations to the Governor regarding mercury exposure in Kentucky. In response to these recommendations, the Environmental and Public Protection Cabinet (EPPC) in cooperation with the Kentucky Cabinet for Health and Family Services-Department for Public Health (CHFS-DPH) and the Department of Fish and Wildlife Resources (KDFWR), formed an internal task force to study and respond to these recommendations. The recommendations primarily focus on communicating the risks of exposure to mercury, specifically in fish tissue, in a manner that informs without creating panic or fear. The task force recommends that these communication efforts target high-risk populations such as women who are pregnant, nursing or could become pregnant and children 6 years old and younger. Another important group to target in this outreach effort is subsistence fishers.

The mercury task force has created this report to address each of the five recommendations made by the EQC. The recommendations are: 1) Inform and educate the public on the risks of mercury in fish, 2) target additional outreach efforts at high-risk areas, 3) strengthen testing and analysis of mercury in the environment, 4) strengthen environmental health surveillance and 5) reduce persistent, bioaccumulative and toxic (PBT) chemicals.

Significantly, the U.S. EPA issued two rules in March 2005 that will have profound impacts on mercury emissions in Kentucky and across the nation. The Clean Air Mercury Rule (CAMR) will reduce nationwide mercury emissions from coal-fired power plants in the amount of 38 tons per year by 2010. In 2018 and thereafter, coal-fired power plants will be required to meet a 15-ton per year cap. In Kentucky, the caps are 1.525 tons per year for the years 2010-2017, and 0.602 tons per year in 2018 and thereafter, a reduction of more than 50 percent. According to U.S. EPA, the Clean Air Interstate Rule (CAIR) will achieve the largest reduction in air pollution in more than a decade. Although aimed at capping sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>) in the eastern United States, it will provide a co-benefit of reducing mercury emissions. When implemented, CAMR and CAIR will result in improved water quality and the attenuation of human health and environmental risks associated with mercury in Kentucky.

State efforts to address mercury in the Commonwealth are ongoing. State government and universities continue to partner on initiatives to reduce mercury in the environment, including funding research and sponsoring collection events. In 2006, the EPPC Division of Waste Management (EPPC-DWM) and the (CHFS-DPH) sponsored four mercury collection events in 2006, with almost 1,000 pounds of mercury and mercury-containing devices collected. EPPC and CHFS-DPH have upgraded Web sites to include new and timely information for citizens to learn more about mercury and mercury contamination.

The CHFS-DPH released an informational brochure developed by the FDA, "What you need to know about Mercury in Fish and Shellfish," marketed to women who might become pregnant, women who are pregnant, nursing mothers and young children. The document is available in English and Spanish.

During Earth Day 2006 the (CHFS-DPH) announced that the Department is taking a proactive approach to mercury reduction and will be taking steps to be mercury free by 2010.

During the 2006 General Assembly, the EPPC sponsored legislation to grant funding to counties and cities for household hazardous waste collection, which will allow for expanded collection of mercury and mercury-containing devices across the Commonwealth. Funding made possible through 2005 legislation enabled the Office of Energy Policy to grant funding for research at Western Kentucky University on the impact of multi-pollution control devices on mercury chemistry and transport.

These efforts are in addition to the collaborative initiatives established between the Department for Environmental Protection (EPPC-DEP), the CHFS-DPH, and the Education Cabinet to assist school officials with guidelines on how to handle mercury spills in schools.

### **Inform and educate the public on the risks of mercury in fish**

Currently, Kentucky has a statewide fish-consumption advisory for mercury based on low-level mercury concentrations found in fish tissue. Kentucky's fish-consumption advisories are "risk based," meaning they categorize risk according to the amount of fish consumed. It is important that our message includes information about the benefits as well as the risks of eating fish. Fish is part of a healthy diet, as well as a healthy economy, so it is crucial that our communication does not create fear or panic but rather accurately conveys the risks of mercury exposure.

Before creating an outreach and awareness campaign, we must first measure the level of awareness about the issue, specifically within the target demographics. We also must know the fish-consumption rates of Kentucky women of childbearing age and children under 6 years old. Studying the target audience will help us identify the group or groups most in need of outreach. This research will also aid us in developing outreach materials that are based on the specific needs of the target audience. The state can and should make use of available resources from the U.S. EPA and other agencies that have developed effective outreach materials.

An important element of the outreach campaign is an informational Web site that will encompass a broad range of mercury-related topics. Currently, each task force agency provides mercury information on its Web site, but there is no single location where a person can find information about mercury-related topics. The task force recommends creation of a state Web site that will be a resource all citizens can use to obtain information about the risk of exposure to mercury.



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### **Target Additional Outreach Efforts at High-risk Areas**

Targeting bodies of water most frequented for subsistence fishing will require research. We recommend exploring the use of Census data and other resources to identify populations and geographic locations that are most likely to rely on subsistence fishing. The task force recommends partnering with state universities or other entities to conduct fishing season surveys, if needed, to further identify populations and reliance on subsistence fishing. Efforts should also be made to collect additional fish tissue data to ensure accuracy in determining the actual level of risk at a particular body of water. The task force recommends appropriate signage be posted at high-risk bodies of water.

### **Strengthen Testing and Analysis of Mercury in the Environment**

The EPPC intends to fill vacant positions, use newly acquired resources, and identify funding and staffing resources to supplement and improve the Division of Water's monitoring program. The Division for Air Quality is measuring mercury in rainwater at two sites. The monitoring efforts are expanding by the addition of equipment for four more locations. DPH currently tests fish from Kentucky permitted fish processors for PCBs and pesticides. Further, in 2004, Kentucky State Lab began testing for methylmercury.

### **Strengthen Environmental Health Surveillance**

No surveillance program currently exists for mercury and its associated outcomes. The task force suggests investigating surrounding states' programs to determine how they collect and track data linking environmental exposures to birth defects and developmental and learning disabilities.

### **Reduce Persistent, Bioaccumulative and Toxic Chemicals**

The EPPC-DEP recognizes the importance of identifying and reducing persistent, bioaccumulative and toxic pollutants (PBT) in Kentucky's environment and will continue to assess the impact of contaminants such as PCBs, mercury, dioxins and pesticides on the environment and encourage reductions of these contaminants. Currently, DPH monitors data and issues fish-consumption advisories based on PBTs. DPH also ensures a safe food supply, and works with other agencies such as KDFWR, the Kentucky Department of Agriculture and others to ensure food supplies are free from PBTs.

### **Conclusion**

Mercury contamination is a global problem that warrants our attention. Mercury is present in our environment and even if we were to eliminate domestic emissions today, mercury contamination in the near term would remain a problem. Since most exposure is a result of fish consumption, it is logical to evaluate mercury levels in Kentucky fish, research populations who are most at risk for mercury exposure and communicate the risks of exposure to them in a way that informs but does not create fear or panic.

## Introduction

### What is mercury?

The U.S. EPA has a broad range of background information on its mercury Web site at <http://www.epa.gov/mercury/index.htm>.

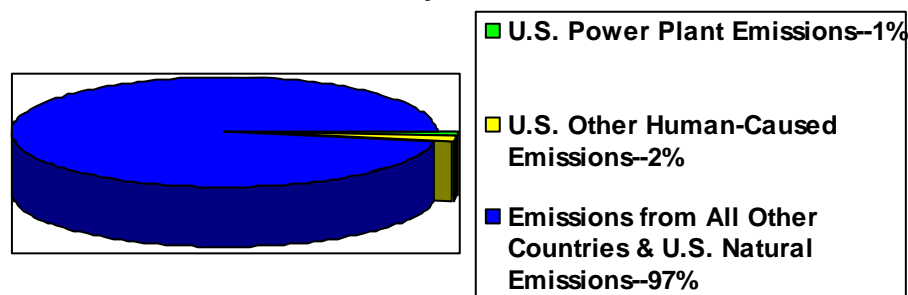
Mercury is a highly toxic element that is naturally occurring. It is found in the air, water and soil and is a trace contaminant found in fossil fuels, particularly coal. Mercury has been used in a wide variety of devices such as thermometers, barometers, fluorescent light bulbs, electrical switches, batteries and pressure gauges. It has also been used for gold extraction and dental restorations.

Inorganic mercury compounds have been commonly used as antiseptics, disinfectants and fungicides. In the past, they have also been used as preservatives in some medicines. Small amounts of these compounds can still be found in some medications. The U.S. Food and Drug Administration (FDA) maintains a list of medicines that contain mercury on its Web site at <http://www.fda.gov/cder/fdama/mercury300.htm>.

Mercury moves through the environment as a result of both natural and human activities. The widespread use of mercury since the beginning of the industrial age has resulted in its global dispersion and its existence in biologically significant quantities in all environmental media. According to the U.S. EPA's National Toxics Inventory, the highest emitters of mercury to the air include coal-burning power plants, municipal waste combustors, medical waste incinerators and hazardous waste combustors. Coal-burning power plants account for over 40 percent of all human-caused mercury emissions, making it the single largest source of domestic mercury emissions. U.S. EPA estimates that about one quarter of domestic emissions from coal-burning power plants are deposited within the contiguous United States with the remainder entering the global cycle. Less than half of all mercury deposition within the United States comes from domestic sources.

According to the U.S. EPA, recent estimates of annual total global mercury emissions from all sources -- both natural and human-generated -- range from 4,400 to 7,500 tons per year. Human-caused U.S. mercury emissions are estimated to account for roughly 3 percent of the global total, and U.S. coal-fired power plants are estimated to account for only about 1 percent.

### Worldwide Mercury Emissions



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Mercury is also released into the environment via spills and improper treatment and disposal of products or wastes containing mercury.

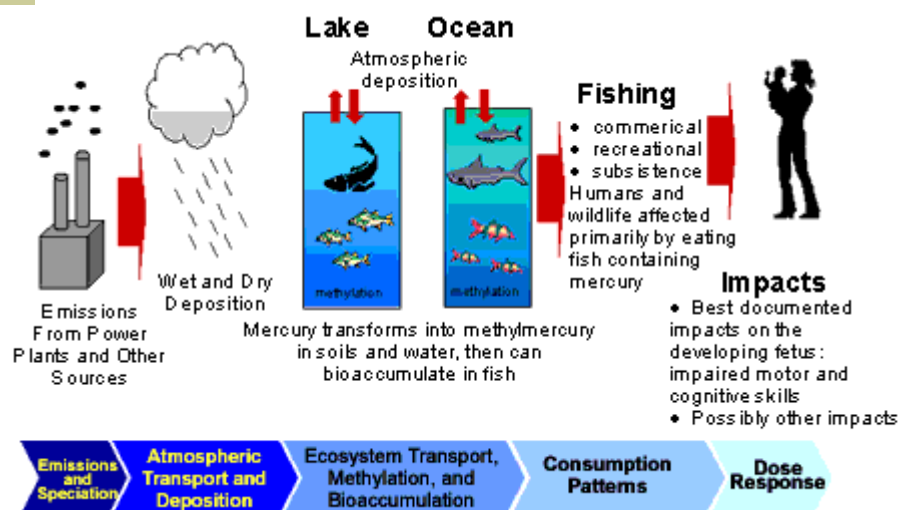
In 1997 the U.S. EPA released the "Mercury Study Report to Congress," which used computer modeling of long-range transport of mercury to predict deposition rates. The report predicted that the highest deposition rates from human and global contributions for mercury occur in the southern Great Lakes and Ohio River valley, the Northeast and scattered areas in the South. Key factors in mercury deposition are the location of mercury sources, the type of mercury emitted, climate and meteorology (humid locations have higher deposition than arid locations). The "Mercury Study Report to Congress" can be viewed and downloaded at <http://www.epa.gov/mercury/report.htm>.

## Exposure

People in the United States are exposed to mercury primarily by eating fish and shellfish containing methylmercury, an organic mercury compound formed when mercury combines with carbon. People and animals are exposed to mercury by eating organisms that live in places where microbes have converted some of the natural and human mercury to a highly toxic form, methylmercury - the most common organic mercury compound found in the environment.

Methylmercury accumulates up the food chain in a process known as bioaccumulation. Small microscopic organisms take up methylmercury as they feed. Animals higher up on the food chain consume the smaller ones and take up the methylmercury in the process. Some fish, those that are higher up on the food chain, have much greater methylmercury concentrations than fish that are lower on the food chain.

### How mercury enters the environment



Source: <http://www.epa.gov/cgi-bin/epaprintonly.cgi>

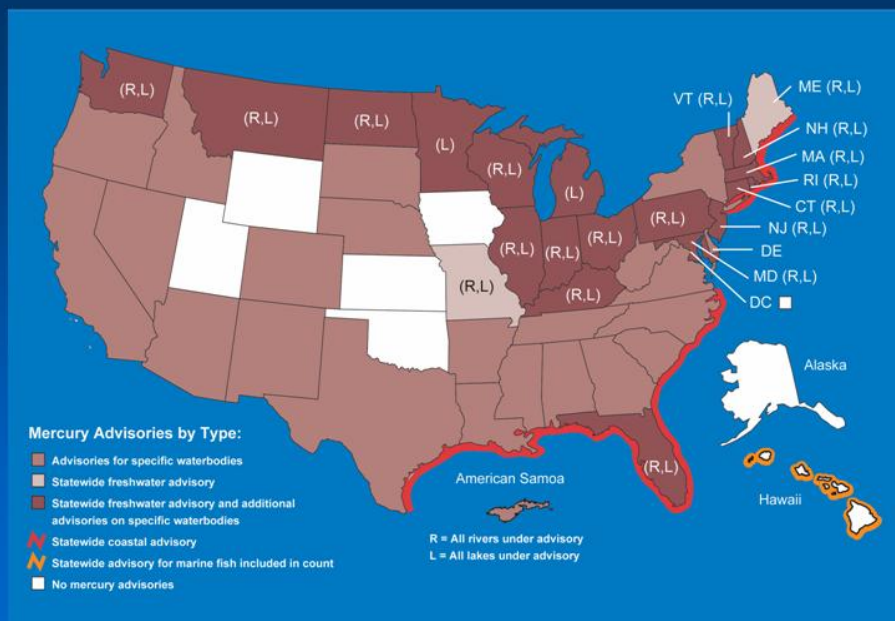
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### Human Health Effects of Mercury

High levels of mercury in the bloodstream can cause damage to the brain, heart, kidneys, lungs and immune system of people of all ages. Research has shown that unborn babies and young children, because they are still developing, are particularly sensitive to the effects of methylmercury on the nervous system.

In 2004, the U.S. EPA and FDA issued the first joint consumer advisory on methylmercury in fish and shellfish. This advisory targeted women who might become pregnant or who are pregnant, nursing mothers and young children. U.S. EPA maintains a Web-based compilation of fish advisories issued by states, tribes, territories and local governments at <http://www.epa.gov/mercury/advisories.htm>.

### Fish Consumption Advisories for Mercury



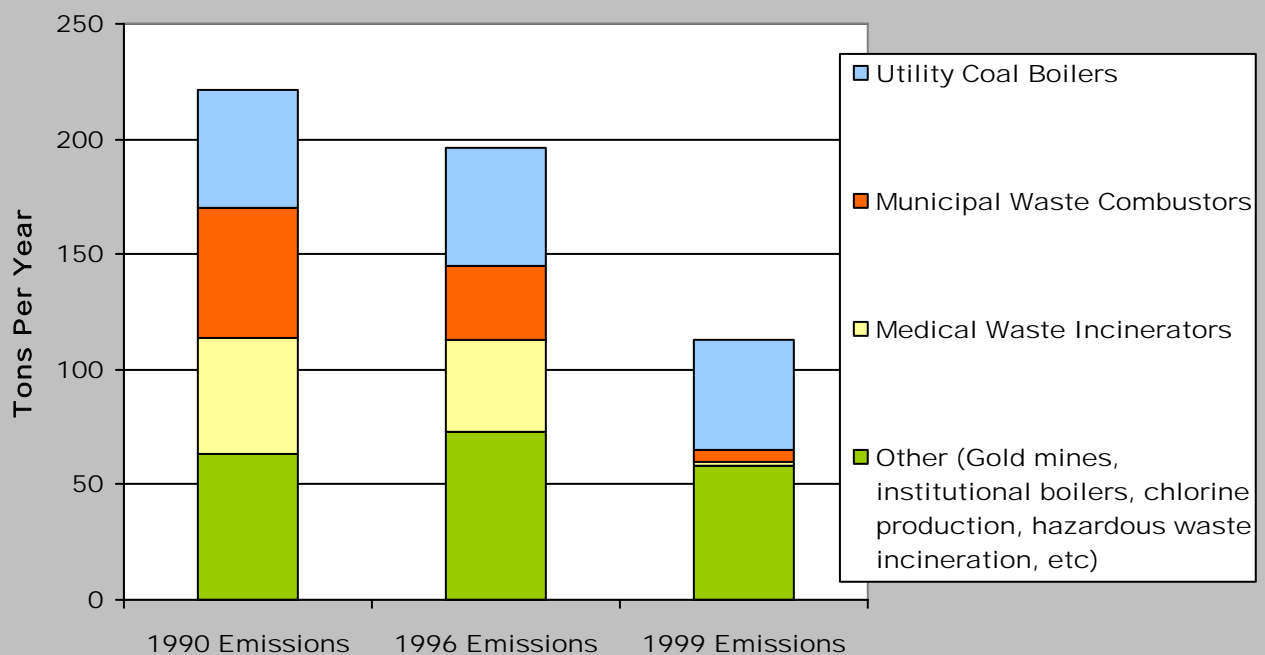


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### Actions to Reduce Mercury Releases

The U.S. EPA reports that domestic mercury emissions have fallen substantially since 1990. This is largely due to federal and state regulations that require industry to reduce mercury releases to air and water and to properly treat and dispose of mercury wastes. In addition, federal and state regulators continue to promote voluntary reductions in mercury use and releases. Citizens can contribute to the effort by purchasing mercury-free products and correctly disposing of products that contain mercury.

Mercury Emissions Have Dropped 45% Since 1990

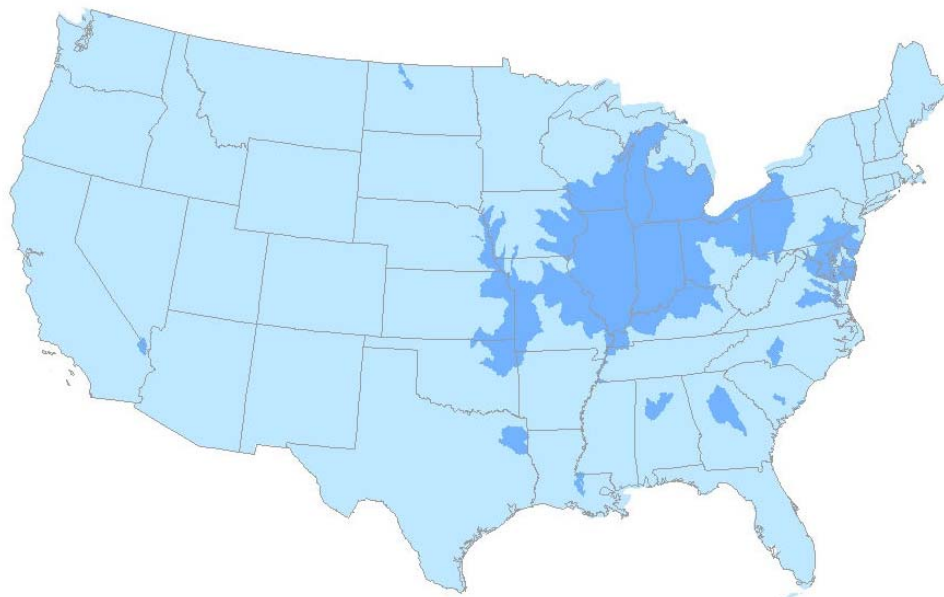


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### Clean Air Mercury Rule

On March 15, 2005, the U.S. EPA issued the Clean Air Mercury Rule (CAMR) aimed at permanently capping and reducing mercury emissions from coal-fired power plants. This rule, in combination with U.S. EPA's Clean Air Interstate Rule (CAIR), will significantly reduce emissions. CAMR establishes "standards of performance" that limit mercury emissions from new and existing coal-fired power plants. This control strategy creates a market-based "cap-and-trade" program that will allow power plants to trade mercury allocations much in the same way that sulfur dioxide and nitrogen oxides are traded in the highly successful acid rain and NOx SIP Call regulations. U.S. EPA believes that this approach will accomplish the needed reductions while providing utilities with flexibility for compliance with the requirements of the program. Furthermore, consumers and businesses will continue to receive a stable flow of affordable energy. Reductions will be achieved in two distinct phases. The first phase cap, due in 2010, is 38 tons per year; emissions will be reduced by taking advantage of "co-benefit" reductions (mercury reductions achieved by reducing sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NOx) emissions under CAIR). The second phase cap of 15 tons per year is due in 2018. Each state will be given a mercury allowance to be allocated to the power plants within that state. See the U.S. EPA Web site at <http://www.epa.gov/air/mercuryrule/index.htm>.

### Mercury Deposition from US Power Plants in 2020 with CAIR and CAMR



Source:  
<http://www.epa.gov/air/mercuryrule/charts.htm>

S. EPA

## Introduction

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In Kentucky, the caps are 1.525 tons per year for the years 2010-2017, 0.602 tons per year in 2018 and thereafter, a reduction of more than 50 percent.

### **National Vehicle Mercury Switch Recovery**

On August 11, 2006, U.S. EPA announced the National Vehicle Mercury Switch Recovery Program aimed at reducing mercury emissions by removing mercury-containing light switches from scrap vehicles before the vehicles are flattened, shredded and melted to make new steel. Furnaces used in steel making are the nation's fourth leading source of mercury emissions. In cooperation with existing state mercury switch recovery efforts, this program is expected to help cut mercury air emissions by up to 75 tons over the next 15 years. See the U.S. EPA Web site at <http://www.epa.gov/mercury/switch.htm>.

### **State Efforts**

During the past few years Kentucky's state government and universities have launched several initiatives to reduce mercury in the environment, including funding research and sponsoring collection events. Working with the Kentucky General Assembly, the EPPC sponsored legislation authorizing grant funding to counties and cities for household hazardous waste collection. The EPPC-DWM and the CHFS-DPH sponsored four mercury collection events in 2006, with almost 1000 pounds of mercury and mercury-containing devices collected. EPPC and CHFS-DPH have upgraded Web sites to include new and timely information for citizens to learn more about mercury and mercury contamination.

The CHFS-DPH released an informational brochure developed by the FDA titled "What you need to know about Mercury in Fish and Shellfish." This brochure is marketed to women who might become pregnant, women who are pregnant, nursing mothers and young children. The document is available in English and Spanish.

During Earth Day 2006 the CHFS-DPH announced that the department is taking a proactive approach to mercury reduction and will be taking steps to be mercury free by 2010.

The Kentucky Environmental Education Council is piloting Kentucky's new Green and Healthy Schools program. The council plans to launch the program statewide in July 2007. The program is designed to provide resources and standards for schools that choose to become more environmentally healthy. There is a mercury section within the program, and participating schools that address this section will carry out projects intended to reduce the risk of mercury in schools. Examples of projects include identifying and removing mercury from the school, establishing a mercury-free purchasing resolution and organizing mercury collections for the community.

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Legislation during the 2005 session of the Kentucky General Assembly established the Energy Research, Development and Demonstration Program to address key recommendations of Governor Fletcher's comprehensive energy strategy, "Kentucky's Energy: Opportunities for Our Future." The legislation authorizes a grants program to encourage responsible development of Kentucky's energy resources, while preserving the state's commitment to protecting the environment. Among projects funded in 2006 is a research effort at Western Kentucky University to study the impact of multi-pollution control devices on mercury chemistry and transport.

These efforts are in addition to the collaborative initiatives established between the EPPC-DEP, the CHFS-DPH and the Education Cabinet to assist school officials with guidelines on how to handle mercury spills in schools.



## **Environmental Quality Commission Recommendations: Mercury Task Force Findings**

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### **1) Public Outreach on Risks of Mercury through Fish Consumption**

The EQC has recommended that a statewide fish consumption public information and awareness campaign be developed in cooperation with the Kentucky Cabinet for Health and Family Services (CHFS), the Environmental and Public Protection Cabinet (EPPC) and the Department of Fish and Wildlife Resources (KDFWR) to target high-risk populations (children, childbearing age women, subsistence fishers) and areas to provide information about the risk of mercury in fish.

#### **Task Force Findings**

##### **Current Activities**

Task force members, representing three executive branch agencies—the Commerce Cabinet, the CHFS, and the EPPC—examined existing public information and outreach activities regarding mercury contamination from fish consumption. The task force identified opportunities for greater cooperation on outreach activities among the three agencies. The members also determined that a broader campaign informing the public about the risks of mercury exposure through other sources merits exploration.

Kentucky has had a statewide fish-consumption advisory for mercury since 2000, based on low-level mercury concentrations found in fish tissue. (<http://www.kdfwr.state.ky.us/fishadvisory.asp?lid=900&NavPath=C101>). The three task force agencies, CHFS, EPPC and KDFWR are responsible for developing and jointly issuing fish-consumption advisories. Kentucky's fish-consumption advisories are "risk-based," meaning they categorize risk according to the amount of fish consumed. These risk-based advisories provide better public health information to our citizens than the former "eat or do not eat" advisories. They also provide more detailed information for special populations (pregnant women, women of childbearing age, and children 6 years old and younger). Advisories and recommendations for fish in the market place (restaurants and grocery stores) are based on the U.S. Food and Drug Administration's (FDA) recommendations for food consumption. FDA is the lead federal agency in assuring the commercial food supply is safe.

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The U.S. EPA/FDA joint guidelines for fish consumption recommend women who are pregnant, nursing or could become pregnant and children 6 years old and younger eat no more than two meals a week of fish. They also recommend avoiding shark, king mackerel, swordfish and tilefish. Kentucky fish-consumption advisories recommend eating no more than one fish meal a week of sport-caught fish from Kentucky's water and stricter limits are set for certain bodies of water, such as the Ohio River.

The three agencies have worked together for a number of years to develop and issue fish-consumption advisories. In addition, each agency creates its own outreach materials and activities. The CHFS-DPH issues press releases geared toward the general public regarding mercury contamination. It has also completed a mercury information Web site. A vital component of public outreach is the KDFWR's "Kentucky Sport Fishing and Boating Guide." The agency distributes 550,000 copies of the guide annually to retail stores, sporting goods shows and outlets, and public facilities across the state. The guide includes information on Kentucky's fish-consumption advisory for mercury and other pollutants. KDFWR advises the public through a routine customer information service phone line.

### **Creating and Implementing Effective Public Outreach**

Mercury persists in the environment and is emitted globally; even if we were to eliminate domestic emissions today, mercury contamination in the near term would remain a problem. Since most exposure comes through fish consumption, the most effective means of reducing mercury exposure is to limit consumption of those fish species known to have higher mercury levels. A statewide public awareness and education campaign, if developed and implemented appropriately, is one way to reach target populations about the risks of consuming certain types of fish in certain quantities. An effective campaign must involve more than disseminating printed materials and/or airing public service announcements. Fish-consumption advisories, whether geared toward sport-caught fish from local waters or store bought fish, are only effective if people are aware of the advisories and change consumption accordingly. By coordinating and

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expanding these efforts, and by seeking additional partnerships with other agencies outside of state government, the state will reach more people in a more effective manner. Collaborating on projects and outreach is the best way to leverage resources and reach more people.

According to the Kentucky Division of Women's Physical and Mental Health, 75 percent of all household consumer choices, such as what to feed children, are made by women. Therefore, women who are nursing, pregnant or could become pregnant or have children 6 and under are the primary audience for these guidelines. To better understand the size of this population, women who are pregnant, nursing or could become pregnant fall under the category of women of child-bearing age, which accounts for approximately 872,000 individuals in Kentucky.

Research has shown that outreach campaigns are successful if they can (1) capture the attention of the right audience; (2) deliver a credible message that the audience understands; (3) deliver a message that influences beliefs or understanding of the audience; and (4) create social contexts that lead toward desired outcomes. According to Janet Weiss and Mary Tschirhart – authors of "The Policy Purposes of Public Information Campaigns" — failure at the first two tasks dooms the campaign. To better direct outreach, it is important to study the target population and break it into subpopulations. It is necessary to separate those who are at risk (approximately 872,000 women) from those who are in need of outreach (women and children within the target population that are exceeding the U.S. EPA/FDA fish-consumption limits). It is unknown whether Kentucky women are consuming unsafe quantities of fish. Furthermore, subsistence fishers, who would likely fall into the subpopulation of those in need, are not a well understood group in Kentucky. It could be argued that the entire population should be reached with these guidelines, but setting priorities will allow us to reach those most in need first.

### **Communicating About Risk**

In addition to understanding the audience, a credible message that is easy to understand is crucial to changing fish-consumption behaviors. The public may be confused when they learn that mercury in fish is unhealthy, but fish is an important part of a

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healthy diet. This brings up a common problem with outreach campaigns. They have positive and negative effects on competing ideas. Fish have many health benefits and in some cases (depending on the species of fish, how much is consumed and who is eating it) the benefits outweigh the risks. Outreach efforts should not undercut the fact that fish is healthy. Complicating fish advisories further, if a pregnant mother eats fish, she may receive health benefits while her fetus receives the risk. Therefore, the benefits and risks may not be distributed equally.

Communicating about mercury in fish is communicating about risk. This aspect sets mercury in fish outreach apart from outreach about other topics such as energy conservation. Accurate information needs to be available so the public can choose the fish they eat wisely in order to continue to receive the health benefits. People need to be able to make decisions based on tradeoffs. A study published in 2003 by Knuth et al, found that describing benefits *and* risks in fish-consumption outreach is important. Kentucky's message should include information about the benefits and risks of eating fish. For example, Ohio and Vermont distribute a poster that uses a thermometer graphic to describe mercury levels of common store bought and sport caught fish species. This can be improved upon by adding a graphic that depicts the fish species' health benefits.

Not only is fish a part of a healthy diet, it is also part of a healthy economy. The economic output of the sport fishing industry in Kentucky in 2001 was \$1,299,964,305, according to the American Sportfishing Association's Sportfishing in America report. A well-crafted, appropriate message, one that results in the desired outcome but does not create fear or panic, is the key to an effective public information and awareness campaign. People should not stop fishing in Kentucky nor should they stop eating Kentucky sport caught fish. Those at risk should simply not exceed recommended consumption limits.



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## **Creating Partnerships/Leveraging Resources**

Not only is it necessary to capture the attention of the right population and develop a credible message that is easy to understand, an effective method of delivering the message is equally important. Oftentimes, agencies spend considerable resources developing a public outreach campaign and yet fall short of reaching the target population. Collaboration with other government agencies, universities, non-profit groups and health care providers will help the state expand its public outreach and education efforts in a more cost-effective, efficient manner.

The University of Kentucky has partnered with the Children's Health Program of U.S. EPA Region 4 to develop state capacity in children's environmental health. The UK Cooperative Extension Service (CES) launched activities in 2004 to spread awareness about the risks of mercury contamination through fish consumption. It expanded on this program in 2005. CES, which has offices in every county of the Commonwealth staffed with personnel trained to work closely with the people in their communities, is uniquely equipped to carry out this important outreach function on mercury contamination. For example, food and nutrition agents and other specialists work with women and children in all areas of the state. These agents are given lesson guides and are trained to teach families about mercury contamination and the sources of exposure. The agency publishes several fact sheets on mercury, including topics dealing with mercury in devices found in homes or in schools, and mercury contamination through fish consumption. The agency disseminates these publications and publishes easily downloaded versions on the CES Web site.

A study done by McCallum et al., suggests that physicians are the most trustworthy source of environmental risk information. Physicians - specifically, pediatricians, obstetricians and general practitioners - should be knowledgeable about the U.S.

EPA/FDA guidelines on fish consumption and Kentucky fish-consumption advisories so that they can answer their patients' questions. Furthermore, physicians can distribute brochures and fact sheets to the target populations.

County health department staff provide health education to the communities they serve on a regular basis. Providing these staff with mercury in fish materials and information will allow them to include this information in their existing local family health programs. Nonprofit organizations working at the grass roots level on children's health issues can also be involved in partnership efforts.

### **Action Items**

- Study the target audience to better understand the level of mercury in fish awareness and to determine fish-consumption rates of Kentucky women. This will aid in identifying subpopulations, such as subsistence fishers, most in need of outreach and will provide baseline data to aid in designing the message.
- Develop outreach materials based on the needs of the target audience and provide the materials to people best suited to deliver them as described above (physicians, county health department staff, extension agents and nonprofit organizations). The state can and should make use of available resources, such as the U.S. EPA/FDA Joint Federal Advisory for Mercury in Fish: "What You Need to Know About Mercury in Fish and Shellfish."

-CHFS-DPH will develop an informational publication with new information from FDA and U.S. EPA regarding the consumption of store-bought tuna, mackerel, swordfish, shark and other fish. This publication will show the benefits of consuming fish as well as which species of fish are lower in mercury, and which species are typically higher in mercury content. It will be reviewed and approved by EPPC and Commerce Cabinet (KDFWR) prior to dissemination.

-Educate and involve health care providers through direct mail outreach and by utilizing common newsletters such as "EPI Notes," which is provided to all physician offices in Kentucky, and "Prenatal News," which is provided to all Kentucky obstetricians.

- Develop a state mercury Web site as a component of a targeted public information campaign. The task force discussed the creation of a state Web site devoted to outreach and resources on mercury contamination. Each task force agency provides information on its Web site, but there is no single state location where citizens can go for access to a broad range of mercury-related topics. The proposed site should also link to the U.S. EPA mercury page, the FDA's Food Safety Web site, and the University of Kentucky, Cooperative Extension Service Web site.
  - A Web site is important because a single brochure or public service announcement cannot include all the relevant information. A Web site will provide a place for people to go to get more information. According to the Kentucky Long-Term Policy Research Center an estimated 80 percent of Kentucky's adults accessed the Internet in 2002. Thus, the majority of Kentuckians are using the Internet.
  - Several states have comprehensive mercury Web sites which could serve as models for the Kentucky Web site. Maryland's Web site in particular does a good job of providing U.S. EPA and state specific information. Links to U.S. EPA publications are provided in one column and state specific information is provided in another column. Using a similar format will allow the Task Force to take advantage of existing U.S. EPA documents instead of having to create new materials.
- Evaluate outreach partnership opportunities, such as with CES, departments of public health, health-care associations and other non-government agencies to reach at-risk populations through public education and outreach.
- Evaluate developing a partnership with the University of Kentucky's Environmental Research and Training Laboratories (ERTL), which received start-up funding by the National Science Foundation's Experimental Program to Stimulate Competitive Research (EPSCoR). ERTL is an interdisciplinary, multi-user analytical facility. Along with the new Center for Watershed Environments at Murray State University,

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ERTL is a component of the Kentucky Environmental Research and Education Consortium (KEREC). State agencies could conduct fishing season surveys and collaborate with ERTL to better understand the subsistence fishing population and its exposure to mercury.

- Continue to seek federal grants. The CHFS and the EPPC submitted a joint grant application in 2005 to seek funding for mercury outreach activities to at-risk populations through the EPA Region 4's competitive Regional Environmental Priorities (REP) solicitation. Although the grant was not awarded in 2005, the agencies will revise the proposal and resubmit it for the 2006 solicitation.
- In addition to working with county health department staff, physicians, extension agents and appropriate nonprofit organizations, other partners can be recruited to spread the message. Potential partners:

Environmental Quality Commission

Universities' schools of public health

Universities' colleges of social work

Kentucky Association of Community Action Agencies

Kentucky Environmental Education Council/Kentucky Department of Education

Kentucky Pollution Prevention Center

University of Kentucky Tracy Farmer Center for the Environment

Kentucky Statewide Quick Response Team for Working with Latino-Hispanic

Audiences

Local media outlets (television and newspaper; Spanish language radio stations)

Free news publications (e.g., Hoy, La Voz)

Local Governments (e.g., post fish-consumption information on local community bulletin boards that are aired via local access television)

University of Kentucky's Environmental Research and Training Laboratory



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## 2) Target Additional Outreach Efforts at High-risk Areas

The EQC has recommended the state target additional fish-consumption education and awareness efforts at high-risk lakes and streams (for example, by posting signage) based on fish tissue mercury concentrations and locations likely to have the greatest number of subsistence and recreational fishermen. In addition, the EQC recommended that EPPC commit to including public outreach about the risks of mercury in its Total Maximum Daily Load (TMDL) implementation plans.

### Task Force Findings

The CHFS-DPH (through local health departments) has participated in posting signage at entrances to bodies of water that have fish-consumption advisories. These signs stipulated the advisory for that particular water body. The department found that vandalism, destruction and theft were often the fate of these signs at a great cost to the taxpayer. Other challenges exist to using signage. Kentucky has over 89,000 miles of rivers and streams. If a certain lake or stream is a high-risk area, where is the best place to post the sign? Additionally, to communicate with subsistence fishers, who may not read English, the sign may have to be in multiple languages.

Furthermore, additional fish tissue sampling is needed to better understand where the high-risk areas are. For example, the Jackson Purchase region of the state has higher levels of mercury in fish than other regions, but that may be due to the small sample size analyzed in that area.

Additionally, as described above, communicating about mercury in fish is communicating about risk. When educating the public about risk it is important to provide them with information about benefits and risks so people can make educated decisions about tradeoffs. It is questionable whether a sign posted by a water body is the best mechanism.

Despite these challenges it is important to identify high-risk bodies of water in the state and make people aware that those areas are of higher risk.

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Although public education and outreach should be part of targeting high-risk areas and populations, they are not typically a part of the technical aspects of TMDL development for any pollutant. It should be noted that public involvement does play a role in TMDL development through public comment periods. Currently, many of the TMDLs under development for watersheds nationally are based on nutrient and bacteriological issues. TMDLs are developed to identify efforts within a watershed that can reduce the cumulative impact of that contaminant on the water body. Implementing a TMDL could include modifications to discharge permits from individual facilities and outfalls to reduce the impact to the environment. Mercury TMDLs require a different method of implementation since typically it is less likely that individual outfalls play a significant role in mercury impacts on aquatic environments. Instead, air deposition is considered to be a significant source of mercury levels in the environment. Because of the potential interstate impact of airborne mercury from power plants, boilers and incinerators, U.S. EPA is working on a process for developing TMDLs on a national scale.

### **Action Items**

- Efforts should be made to collect additional fish tissue data to improve the Task Force's confidence in the actual level of risk at any body of water.
- EPPC, CHFS-DPH and KDFWR will review proposed language for new signs and will explore the most effective means of placing signage. The signage should be in languages necessary to reach the people in the area. Signage will be used in areas where there is need and also where there is a low incidence of vandalism expected.
- Challenges for reissuing signs include cost effectiveness. These signs are damaged, vandalized or stolen and may not be the most cost-effective means for outreach to the public or the most effective use of state dollars. Agencies will coordinate in the development of a communication "tool," such as a fishing ruler and/or a refrigerator magnet, which would include information regarding mercury in sport caught fish. KDFWR would be the lead agency for this. The tool would be provided to persons at high-traffic fishing venues such as boat shows, and at events such as the

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Kentucky State Fair. The information tool could be produced in multiple languages. The most cost-effective tool to improve communication of this information will need further study and investigation. Consideration as to what other states have developed would be useful.

- Signage may be posted at commonly used fishing spots at the high-risk body of water, but this should not be the only strategy used. People in the area, including those who fish, physicians, health department staff, extension agents and nonprofit organization staff, should be made aware that a high-risk body of water has been identified. CHFS-DPH will participate in an elevated public information awareness campaign with lead agencies KDFWR and EPPC to provide current information to these people in high-risk fishing areas.
- Targeting water bodies most frequented for subsistence fishing will require research. As a start, the state can use Census data to identify populations that are more likely to rely on subsistence fishing. Additionally, partnerships can be developed with the state university system to conduct fishing season surveys to further identify locations, populations and reliance on subsistence fishing. Furthermore, the Task Force can communicate with other states that have provided outreach to subsistence fishers to learn their strategies for identifying and communicating with them.
- High-risk areas will be posted on the state mercury Web site.

### **3) Strengthen Testing and Analysis of Mercury in the Environment**

The EQC has recommended that the state increase the number of water bodies sampled each year for mercury, specifically in fish and wildlife lakes and other major fishery resources in the state; that the EPPC-DEP initiate a comprehensive rainwater-testing program for mercury and work to correlate air and rainwater sampling with fish tissue and bioaccumulation data; and that EPPC-DEP identify sources of mercury,

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outline the existing regulatory structure and mercury reduction efforts and identify possible strategies for further mercury reduction.

### **Task Force Findings**

As mentioned, the Division of Water is developing a partnership with faculty at a state university to build a more complete data set of fish tissue including species, size and geographic variability. Those sampling plans will be developed to support the efforts of the Division of Water. That effort, in combination with additional equipment for sampling (backpack and boat-mounted electro-shockers) that is being acquired, will increase the division's sampling capacity.

The Division of Water intends to fill vacant positions, use newly acquired equipment and work with researchers at the university to gather more data to supplement the Division of Water's monitoring program. Since two years of data are needed for issuing fish-consumption advisories and modification of localized advisories, the additional data collected will allow for a better foundation for the advisories.

The Division for Air Quality is currently measuring mercury in rainwater at two sites. The monitoring efforts are expanding by the addition of equipment for four more locations by 2007. Additionally, the division is measuring total mercury using continuous samplers at five sites. The division has been measuring for particle-bound mercury from 2002-2005 at ten sites. Particulate-bound mercury monitoring has been reduced to six sites in 2006. Known or suspected sources of airborne mercury were used in designing the monitoring network. The map on page 25 shows the location of the mercury monitoring network for 2005. Monitoring of airborne mercury in particulates and rainwater requires specialized equipment since the measurements are at extremely low levels and the possibility of contamination is elevated.

DPH currently tests fish from 13 permitted fish processors for PCBs (specifically Aroclor) and pesticides (Chlordane). Further, in 2004, Kentucky State Lab began testing for methylmercury. State environmental health inspectors take samples at the 13 facilities annually. The inspectors collect multiple samples from each establishment.



Historically, contaminant levels have not exceeded action levels. These facilities market products ranging from native fish species (e.g., catfish, trout, bass, prawn and roe) to imported species (e.g., shellfish and lobster) from surrounding states and other countries.

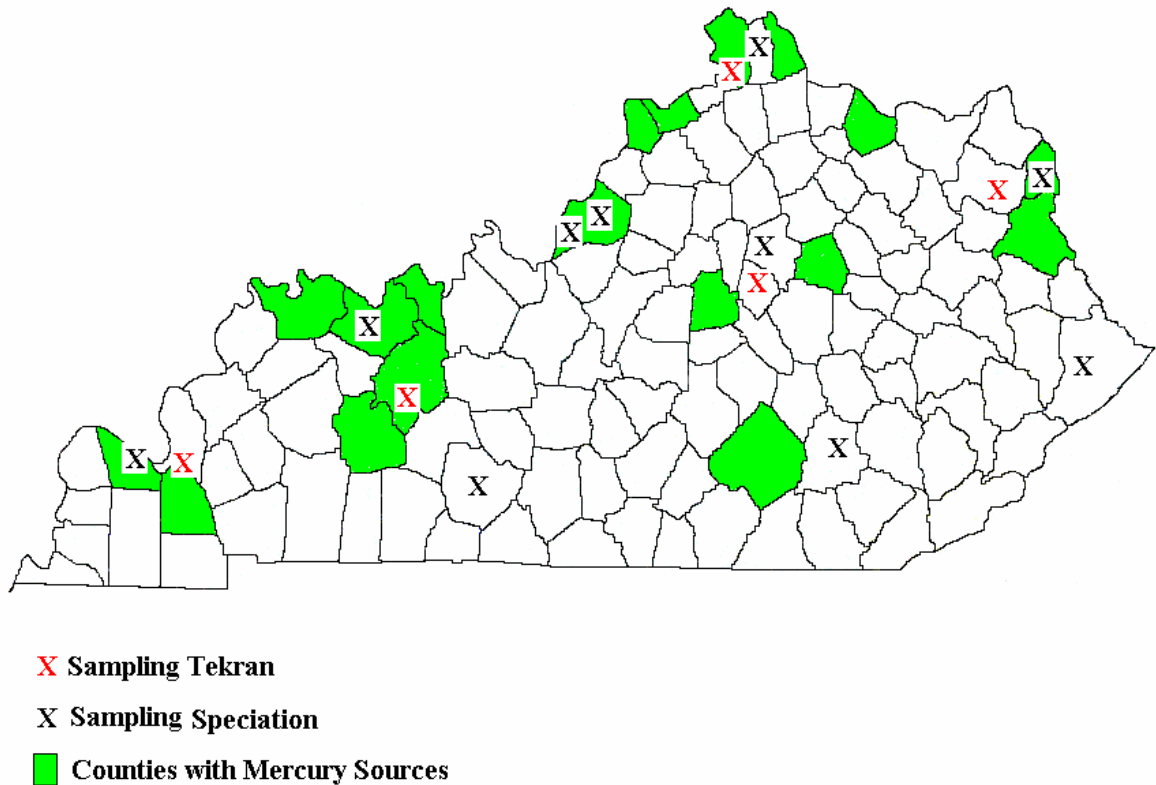
### **Action Items**

- The issue of mercury in fish tissue requires a perspective that draws from expertise from different programs within the agencies. The task force will provide oversight for evaluating these problems across agencies. This includes evaluation of data collected by the CHFS-DPH, EPPC-DEP Division of Water and Division for Air Quality, and KDFWR and includes identification of sources of mercury.
- Information will be entered into the current database that is used for data review and fish-consumption advisory determinations. In the future, the data will be entered into the state's COMPASS database, which is in the final stages of development.
- Given the recent developments on the federal level, the Commonwealth will track the progress of mercury emission regulations proposed nationally. EPPC supports the development of clean coal generating in Kentucky. Clean coal technology, including circulating fluidized bed and integrated gasification combined cycle, offers significant reductions in mercury and other pollutants.
- CHFS-DPH will include mercury when testing Kentucky fish processors' products. New DPH laboratory equipment will allow mercury testing.
- The EPPC-DEP Division for Air Quality will continue to enhance and expand its air monitoring network to better facilitate an understanding of all atmospheric pollution, especially mercury. Additional partnerships for research are being considered with ERTL.

### **Preliminary List of Potential Partners for this effort**

- U.S. EPA
- NOAA
- Other atmospheric research programs and grant sources
- University labs (ERTL)
- ORSANCO

## Mercury Sampling Network 2004-2005



### 4) Strengthen Environmental Health Surveillance

The EQC has recommended the development of capabilities within the Kentucky Department of Public Health to conduct epidemiological studies to assess potential links between environmental exposures and birth defects.

#### Task Force Findings

Although CHFS-DPH has an extensive program for tracking illness and birth defects, it does not have a program correlating mercury and birth defects. DPH has a birth defects registry for children from birth to 5 years old. DPH collects information on cerebral palsy and failure-to-thrive conditions, but only includes in-patient hospitalization data. DPH currently does not gather information on autism.

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No surveillance program exists for mercury and its associated adverse outcomes; however, statewide programs exist in Indiana, Minnesota and Oregon. Additionally, federal programs are established through the U.S. EPA, the Agency for Toxic Substance and Disease Registry (ASTDR) and the U.S. Geological Survey (USGS).

### **Action Items**

- Partner with the Department of Education to remove mercury from schools. EPPC-DEP, CHFS-DPH and the Department of Education can work to develop a program and seek grants to remove mercury (and other hazardous chemicals) from schools in the Commonwealth.
- Coordinate improved outreach through doctors' offices and hospitals. By increasing awareness to physicians/nurses and other health care workers, we hope to raise the awareness of mercury contamination.
- CHFS-DPH needs to expand current data systems to correlate possible linkages between mercury and birth defects and other illness. CHFS-DPH proposes investigating surrounding states to determine what level of data and tracking is used to link environmental exposures and birth defects, and track developmental and learning disabilities. A regulation change would be needed to collect information on autism, and a legislative change would be necessary to require mandatory reporting from outpatient visits. DPH will investigate these revisions.

### **Issues to Consider**

- The relationship between the presence of mercury and mental retardation or developmental illness does have plausibility, but present state data is insufficient to correlate mercury and adverse health outcomes.
- Cerebral Palsy information is collected in the birth registry, but this condition is associated with methylmercury exposure, not total mercury which is the environmental endpoint sampled presently.
- Explore possibility of forming a working group that would include members of the Kentucky General Assembly to address legislative and/or regulatory issues regarding

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## **5.) Reduce Persistent, Bioaccumulative and Toxic (PBT) Chemicals**

The EQC has recommended that the Department for Environmental Protection (EPPC) assess priority persistent, bioaccumulative and toxic pollutants (PBT) and develop a plan to reduce the risks posed to public health and the environment. The EQC has recommended the department screen PBTs, build partnerships to reduce and eliminate PBTs and establish a baseline monitoring program.

### **Task Force Findings**

The EPPC-DEP recognizes the importance of identifying and reducing PBTs in Kentucky's environment. The Department will continue to assess the impact of contaminants such as PCBs, mercury, dioxins and pesticides on the environment and coordinate efforts to monitor and encourage reductions of these contaminants. The EPPC-DEP Division of Water incorporated a no-mixing-zone provision for bioaccumulative chemicals of concern (which includes mercury and 21 other chemicals) in meeting water quality standards (401 KAR 5:029), thereby creating a stricter standard for bioaccumulative chemicals.

Currently, CHFS-DPH monitors data and issues fish-consumption advisories based on PBTs. DPH also ensures a safe food supply and works with agencies such as KDFWR, the Kentucky Department of Agriculture and others to ensure food supplies are free from PBTs.

Nationally, U.S. EPA continues to address priority PBT pollutants through the PBT initiative. See U.S. EPA's PBT Chemical Program Web site at <http://www.epa.gov/pbt/>. The goal of the PBT initiative is to study sources of mercury and other PBTs using a multimedia approach and develop action plans that address each of the PBT pollutants.

### **Additional work of the Mercury Task Force**

Although not mentioned in the EQC recommendations, elemental mercury, or quicksilver, poses a human health threat. Recently, efforts have been made by task force agencies to reduce this threat. Elemental mercury contamination incidents at schools have been on the rise. These incidents pose significant threats to students, faculty and

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staff, and family members in the community. As a first step in addressing this issue, the CHFS convened a meeting in March 2005 to discuss lessons learned and to coordinate future responses. One suggestion is that the relevant responding agencies (CHFS, Departments of Public Health, U.S. EPA, EPPC-DEP, local poison control, Division of Emergency Management and school districts) create prepackaged information for schools, parents and health care workers. In April, these agencies collaborated in sending a letter to schools that offered guidelines on how teachers and administrators should handle mercury spills. The guidelines will help school officials know how to respond to a mercury spill and make them and the public more aware of the health risks mercury poses.

Elemental mercury spills are not just a threat to schools, but to residences and business too. Oftentimes school spills result from a student bringing mercury found in the home to the school. EPPC, CHFS-DPH, the Education Cabinet and the Madison County Health Department joined Madison County in initiating the first mercury collection program in Kentucky. This multi-agency project took place in Madison County during a household hazardous waste drive. This was the first step in developing a mercury collection program for Kentucky. This two-day program removed 37 pounds of mercury (72 thermometers, 19 manometers, 28 thermostats and four containers holding several pounds of mercury) from homes, schools, hospitals and businesses in the county. In 2006, this initiative was extended statewide. The EPPC-DWM and CHFS-DPH sponsored four mercury collection events in 2006, with almost 1,000 pounds of mercury and mercury-containing devices collected.

The Task Force members suggest collaborating in a broader effort to reduce the public's exposure to mercury from other sources including thermometers, batteries and other goods. Potential partners, such as the Kentucky Pollution Prevention Center, Cooperative Extension Service and the Department of Education, can aid in expanding this effort.



## Resources

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- McCallum, David B., Sharon Lee Hammond, Vincent T. Covello. "Communicating about Environmental Risks: How the Public Uses and Perceives Information Sources," *Health Education Quarterly*, Vol. 18(3):349-361 (Fall 1991)
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